UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,602	07/15/2003	Naoki Matsumoto	010986.52602US	5343

23911 7590 01/11/2008
CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER	
ALEJANDRO MULERO, LUZ L	
ART UNIT	**PAPER NUMBER**
1792	

MAIL DATE	DELIVERY MODE
01/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/618,602	MATSUMOTO ET AL.	
	Examiner	Art Unit	
	Luz L. Alejandro	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 16-26* is/are pending in the application.

4a) Of the above claim(s) *1-12,18,20 and 24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13, 16-17, 19, 21-23, and 25-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/31/07 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13, 16, 19, 23, and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al., U.S. Patent 6,469,448 in view of Baldwin, Jr. et al., U.S. Patent 6,280,563, Okabe et al., JP 2000-355771 and Glukhoy, US 2003/0168172.

Taguchi et al. shows the invention substantially as claimed including a plasma processing apparatus for supplying radio-frequency power into a process chamber so as to generate plasma, to thereby treat an object to be processed with the plasma; wherein the process chamber has a top which is disposed opposite to the object to be processed through the medium of a region for generating the plasma; wherein a plurality of metal-based radio-frequency antennas 9 are disposed in the process chamber, wherein the process chamber has a chamber wall having at least one antenna so that the antenna penetrates the chamber wall into the inside of the process chamber (see figs. 5 and 12 and their descriptions).

Taguchi et al. does not expressly disclose where the top plate comprises a metal or silicon based material. Baldwin, Jr. et al. discloses a top plate 44 with a potential applied which is made of a metal (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi et al. so as to have the top plate composed of a metal because, as disclosed by Baldwin, Jr. et al., such a material is suitable for having RF potential applied.

Taguchi and Baldwin, Jr. et al. are applied as above but do not expressly disclose wherein the antenna provides linear lines so that the direction of electric currents in adjacent antennas are the same. Okabe et al. discloses wherein the

antenna provides linear lines (4,5) so that the direction of electric currents in adjacent antennas are the same and the adjacent antennas are in parallel with each other on the same plane which is parallel to the object to be processed (see abstract and Figures). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi et al. modified by Baldwin, Jr. et al. so as to include the claimed antenna configuration as disclosed by Okabe et al. because using such an antenna arrangement a more uniform plasma over a wider area is possible.

Taguchi et al., Baldwin, Jr. et al., and Okabe et al. are applied as above but do not expressly disclose that the antenna disposed in the process chamber is covered with an insulating material so that the radio-frequency antenna does not directly contact the plasma, wherein an insulating fluid is circulated between the antenna and the insulating material, and wherein the process chamber has a second chamber wall opposed to the first chamber wall, and each antenna penetrates the first chamber wall and the second chamber wall. Glukhoy discloses that the antenna disposed in the process chamber is covered with an insulating material 64 so that the radio-frequency antenna does not directly contact the plasma, wherein an insulating fluid is circulated between the antenna and the insulating material using tubes 82 (see paragraph 0035-0036), and wherein the process chamber has a second chamber wall opposed to the first chamber wall, and each antenna penetrates the first chamber wall and the second chamber wall. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi et

al. modified by Baldwin, Jr. et al. and Okabe et al. in order to cover the antenna with an insulating material, circulate an insulating fluid between the antenna and insulating material, and have an antenna penetrating opposing sidewalls because such a structure will protect the antenna as well as control the temperature of the antenna to avoid damage and be suitable for generating an inductively coupled plasma.

Concerning claim 16, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum length of the antenna based upon a variety of factors including the desired area of the plasma distribution and such limitation would not lend patentability to the instant application absent a showing of unexpected results.

Regarding claim 23, note that the apparatus as shown in Taguchi et al. includes a susceptor 6 for supporting the object to be processed in the process chamber, and a bias 7 is applicable to the susceptor.

Concerning claim 25, note that in the apparatus of Taguchi et al. modified by Baldwin, Jr. et al. and Tonotani et al. the electric fields are capable of being strengthened by one another.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al., U.S. Patent 6,469,448 in view of Baldwin, Jr. et al., U.S. Patent 6,280,563, Okabe et al., JP 2000-355771, and Glukhoy, US 2003/0168172 as applied to claims 13, 16, 19, 23, and 25-26 above, and further in view of Holland et al., U.S. Patent 5,975,013 or Takagi et al., US 2004/0020432.

Taguchi et al., Baldwin, Jr. et al., Okabe et al., and Glukoy are applied as above but do not expressly disclose wherein the thickness or diameter of the radio frequency antenna disposed in the process chamber is changed along with the propagation direction of the radio frequency power. Holland et al. discloses varying the thickness or diameter of a radio frequency antenna (see fig. 11 and its description), as does Takagi et al. (see fig. 2 and its description). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi et al. modified by Baldwin, Jr. et al., Okabe et al., and Glukhoy so as to vary the thickness and/or the diameter of the coil as claimed because in such a way a uniform plasma density can be achieved.

Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al., U.S. Patent 6,469,448 in view of Baldwin, Jr. et al., U.S. Patent 6,280,563, Okabe et al., JP 2000-355771, and Glukhoy, US 2003/0168172 as applied to claims 13, 16, 19, 23, and 25-26 above, and further in view of Grimbergen et al., U.S. Patent 6,390,019.

Taguchi et al., Baldwin, Jr. et al., Okabe et al., and Glukhoy are applied as above but do not expressly disclose wherein a measuring device is disposed in at least one position of the top plate so as to monitor the state of the generated plasma and the top plate has a plurality of apertures for passing a gas to be supplied to the processing chamber. Grimbergen et al. discloses a measuring device 25 which is disposed in the top of the chamber so as to monitor the state of the generated plasma (see fig. 1 and its

description), and a top plate which has a plurality of apertures for passing a gas to be supplied to the process chamber (see, for example, figs. 2 and 3a and their descriptions). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi et al. modified by Baldwin, Jr. et al., Okabe et al., and Glukhoy so as to have the measuring device and apertures as suggested by Grimbergen et al. because having the measuring device and apertures in the top plate allows for accurate measurements and uniform distribution of the gas across the workpiece.

Response to Arguments

Applicant's arguments filed 10/31/07 have been fully considered but they are not persuasive. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Luz L. Alejandro
Primary Examiner
Art Unit 1792

December 10, 2007